

**MODIS SCIENCE TEAM MEMBER**  
**Semi-Annual Report (June - December 1992)**

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**a) Task Objectives**

The objective of this phase of the project was: to continue the research program developing the 'at-launch' algorithms for MODIS atmospheric correction, vegetation indices, fire detection and land cover; to build the infrastructure to permit the research to be undertaken, by purchasing the necessary computer hardware and to establish the necessary collaborative research projects.

The collaborative research projects are intended to expand the scope of the team members activities and involve a larger community in the MODIS research. In addition preliminary results of the research were presented at key scientific meetings. The project was also represented at the MODIS Team meeting. Results of the project were written up and submitted for publication.

**b). Tasks Accomplished (Data analysis and interpretation).**

Specifically the project has addressed the following topics over the last six months:

**MODIS Atmospheric Correction**

- **Atmospheric Correction.**

- **6s Code** : New procedures for computation of aerosol scattering properties have been developed and implemented. Simulations have been extended to include the case of airborne sensors and targets not at sea level. Integration of new spectroscopic data for gaseous absorption and BRDF signatures is currently underway.

- **Stratospheric Aerosols.** An operational procedure for correction of stratospheric aerosol effects on AVHRR data was developed and tested for the tropics. The test showed that the

procedure resulted in NDVI value closer (higher) to the climatological value. Improvement to this procedure is envisioned through the addition of information on optical thickness from the near-infrared channel.

- Aerosol Retrieval. Daily AVHRR GAC data were obtained from the GIMMS group at GSFC and sample LAC data were obtained from the EDC DAAC. The DDV algorithm for aerosol correction is being applied to the data and tested using sun-photometer data collected at GSFC, Brazil and Southern Africa.

- Algorithm Validation. Collaboration continues with Brent Holben (GSFC) to develop a network of Sun Photometers which will provide the validation of the MODIS atmospheric correction techniques. Work continues on testing of the new version of the instrument software. The prototype instruments now at GSFC and have been field tested in Brazil. One instrument was purchased during FY 92 and has been operated in a testing phase at GSFC. A paper will be presented in April at IGAC'93 (International Global Atmospheric Chemistry Project, Ellat, Israel).

- AVHRR Calibration: The AVHRR is the primary source of daily data for simulating the algorithms to be used for MODIS. As part of the aerosol and land cover algorithm development exercise it is necessary to remove the degradation in the response of the visible and near infrared channels. Visible Sensor degradation of NOAA was studied for the complete lifetime of the NOAA-9 satellite using the method presented at IGARS'92 (Vermote et al). A journal paper is in preparation.

- MODIS Land Cover

- A provisional global land cover classification was generated in collaboration with Drs. Townshend and DeFries (UMd). The data set was designed specifically for use by the Sellers/Mooney IDS Group. The data set is at a 1° resolution and was derived from multitemporal classification of one year of the GIMMS AVHRR GAC data.

- The Team Member attended the MODLAND Land Cover Working Group meeting at Missoula Montana.

- Plans have been made to generate a higher resolution land cover map for Africa using the GIMMS AVHRR 8km data.

Sample Landsat data are being assembled for the training and testing associated with this data set.

- Townshend and DeFries developed and tested a procedure for mixture modelling using continental scale AVHRR data.

### **c) Data / Analysis / Interpretation**

AVHRR GAC data (Gimms), LAC data (EDC) and HRPT data (IGBP Global data set) were analyzed during the reporting period.

Sunphotometer data were collected at GSFC.

Preliminary discussions were held concerning use of the MODIS Airborne Simulator data.

Landsat data were ordered through the EDC MODIS test site initiative. Landsat TM data were acquired through the EOSAT NASA data grant.

### **d) Anticipated future actions**

Research:

Continued AVHRR/ASAS Atmospheric Correction Study

Continued AVHRR Fire Algorithm Study

Continued AVHRR Land Cover Classification Study

Continued AVHRR Vegetation Index Processing Improvements

Initiate MODIS Airborne Simulator Spectral Analyses

Upcoming Meetings:

MODIS Team Meeting (GSFC - March '93)

- SAFARI FIRE Results meeting (Stellenbosch - May '93)

- MODIS / LTER Meeting (GSFC - March 25/26 '93)

- IGBP-DIS Fire Algorithm Workshop (GSFC - February '93)

- Operationalisation of Remote Sensing (Holland - April '93)

Hardware Purchase

- One additional HP workstation and peripherals

### **e) Problems/Corrective Actions**

Nothing to report

**f) Papers \***

1. Contrast Reduction Atmospheric Correction (IGARS' 92 D. Tanre, E. Vermote- completed)
2. Satellite Remote Sensing of Fires (Dahlem Conference Proceedings : Justice, Malingreau, Setzer- completed)
3. Calibration of the AVHRR Visible and Near IR channels using Radiances Measured by Remote Sensing (IGARS' 92 E. Vermote et al.- completed)
4. Data Systems and Initiatives (The ISLSCP Meeting Special Edition of Remote Sensing of the Environment - in preparation).
5. Global Aerosol Climatology over the Tropical Belt using AVHRR Data (IRS'92 Vermote, Holben, Kaufman, El Saleous, Tucker - in preparation)